

A PRELIMINARY REPORT ON PERMAFROST OCCURRENCE
IN SEYMOUR ISLAND (MARAMBIO ISLAND),
ANTARCTIC PENINSULA REGION (ABSTRACT)

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Seymour Island (Marambio Island, 64°S 56°W) in the Weddel Sea is located near James Ross Island. As there was no ice-sheet over the island during and after the last glaciation period, the ground has remained frozen and permafrost of considerable depth has developed in the ground. The authors conducted the field survey related to the genesis and occurrence of permafrost in the island. The Japan—Argentina joint expedition was established by the support of Grant-in-Aid for Overseas Scientific Research, from the Ministry of Education, Science and Culture, Japan. Four Japanese and four Argentina scientists spent two months in the island and various field investigations were conducted.

Concerning the distribution of permafrost, geophysical investigations such as geo-electrical resistance measurements and seismic sounding measurements were carried out. According to these results, the depth of permafrost (permafrost table) is estimated at 180 m in the upper terrace (Meseta level), 100 m in the middle terrace (Sub-Meseta level) and 48 m in the lower terrace (Larsen level). Characteristic geomorphologies which develop in the continuous permafrost regions were also studied to elucidate the genesis and Quaternary history of permafrost.

Ice-wedge is one of the typical features in the permafrost region, and it was investigated by means of boring exploration at the site of the upper terrace. Ice-wedge grows into the Tertiary bedrock instead of soft Quaternary sediments which are common in Arctic regions. The total length of ice-wedge is 180 cm and width at the top is 40 cm. These dimensions indicate the size of ice-wedge in Seymour Island is far smaller than ice-wedge in Arctic regions. The chemical analysis of melt water of ice-wedge shows high concentration of NaCl and CaSO₄. The surface patterns of ice-wedge network were traced to tundra polygons on both upper and lower terraces. Other features such as ground ice accumulations were also investigated.

The physical conditions of permafrost were discussed in relation to the past and present climatic conditions. The annual mean temperature in the island is -9.5°C and the maximum thaw depth (active layer) was estimated at 80 cm by a long-term monitoring of ground temperature profiles. The low summer temperature is mainly due to the sea ice. The comparison between Antarctic and Arctic permafrost suggests that permafrost in Antarctic regions began to form before the last glaciation period, but it was after the period in Arctic regions.

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